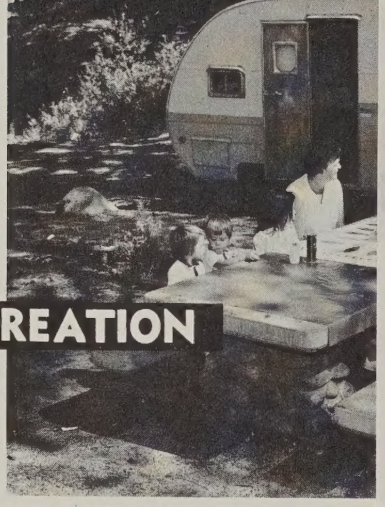
Herefords on the Coconino National Forest

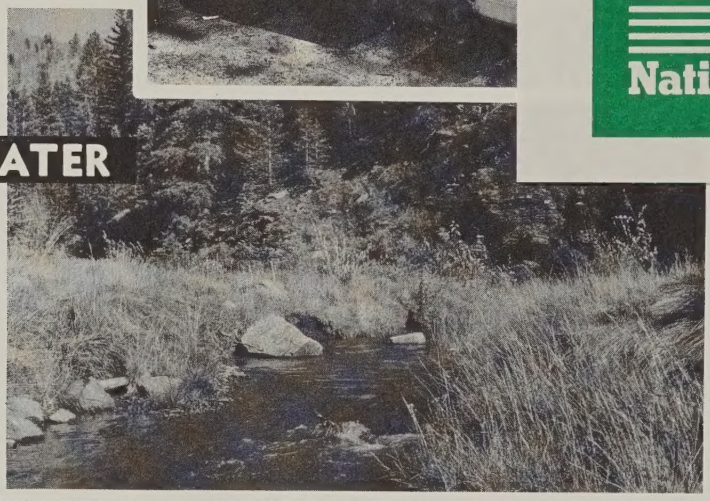
ROTATION GRAZING

EXAMPLES AND RESULTS

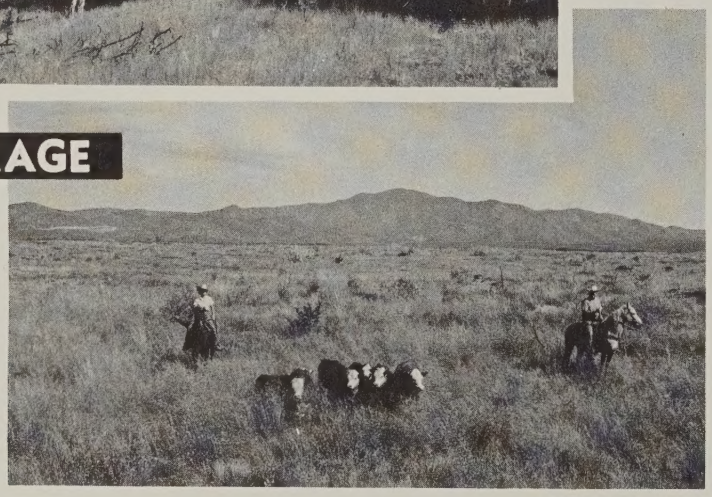
Southwestern Region

U. S. DEPARTMENT OF AGRICULTURE • FOREST SERVICE





COORDINATED USES OF THE National Forests



Ranchers and range managers are interested in improving forage and livestock production by intensifying management. While the principle of improving range conditions by periodically resting range vegetation during its growing season has been known for 50 years or more, results of applying the principle under range conditions have seldom been summarized to provide guidelines for the practicing range manager, whether he is a stockman or technician.

This booklet has been prepared to bring together examples where rotation management systems are applied on a practical scale and to describe the results of some controlled grazing experiments. It presents case histories that illustrate how actual plans were developed and how they are working under practical conditions. Both problems and benefits are revealed in these brief reports.

Any of the systems described might (and probably would) have to be modified to fit another ranch or range allotment. Nevertheless, the studies presented here illustrate principles and ideas. Most important, they give us an opportunity to profit by the experience of those who have tried out old and new ideas on their cattle and sheep ranges.

I hope this booklet will provide a stimulus for more development and practical testing of intensive management on National Forest ranges and elsewhere. This is our main purpose in publishing these case histories.

Fred H. Kennedy

FRED H. KENNEDY
Regional Forester

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SECTION I

PLANT & ANIMAL REQUIREMENTS

Success in using any intensive grazing management plan depends on how well the plan provides for two basic needs:

1. The needs of the forage plants.
2. The needs of the livestock (and livestock owner).

A management system which overlooks either plant or animal requirements will usually fall short of its goal. Either the range or the rancher suffers when the plan does not provide for these needs.

PLANT NEEDS

Because the forage plant is required for grazing, its physiology and reactions ought to be understood by anyone who undertakes to manage range land. Range plants must provide livestock forage and yet supply their own needs for growth and reproduction. A year in the life of a typical perennial range grass or forb could be described as beginning in the fall, as the plant becomes dormant after a season's growth.

To survive the winter and begin spring growth, the plant has stored reserves of carbohydrates in its roots and root crown. This food supply is used at a very slow rate during the winter. As the plant begins its spring growth, much of the remaining food reserve is used. Stored carbohydrates continue to be the sole source of food for the plant until enough chlorophyll-bearing leaves are grown to produce food needed for the plant's growth. After the initial spring growth, the plant depends largely on currently produced food for growth and seed production. Storage of carbohydrates reaches a peak between seed ripening and fall dormancy. Fluctuation in moisture and temperature affect the growth and storage patterns, which also vary between species. Detailed data on many major forage species have been published in scientific journals. This information, coupled with local observations, can be used for management planning.

Grazing — intensity, frequency and timing — can profoundly affect the growth and reproduction of the plant. During the dormant fall-winter period, dry leaves and seed stalks usually can be grazed without damaging the plant. The root crown, which contains stored plant food, must not be grazed and enough stubble should be left to protect the root crown from adverse weather, trampling and other effects. A critical period is when the plant starts spring growth, reducing stored food supply when producing the first leaves. However, once sufficient growth is available to manufacture plant food, grazing is not unduly detrimental provided (1) it is not too intensive and (2) it is terminated in ample time for the plant to regrow and complete its normal growth cycle.

Grazing during the period of flowering and seed production will interfere with seed production and reduce essential carbohydrate storage. Removal of green leaves and stems during the food storage period that follows seed production can deprive the plant of needed reserves, reducing its vigor and retarding its growth in the spring of the following year.

Cropping of seed stalks stimulates tillering (production of new shoots) in some cases, but benefits are lost if plants do not receive subsequent rest to allow the tillers to develop. Stolon (runners) and rhizome (rootstock) production depends on good plant vigor, which in turn depends in part on food reserve storage.

Weather conditions strongly affect plant growth, and hence plant response to grazing. Cold or dry spring weather can delay the development of the cool-season growers such as western wheatgrass, Arizona fescue and crested wheatgrass which depend largely upon winter and spring precipitation to make their growth. In the Southwest, warm-season grasses (blue grama, for example) make their annual growth largely after summer rains begin. Mixtures of cool-season and warm-season growers offer opportunities for broader realization of benefits from periodic deferment. Weather variations must be considered along with composition of cool-season and warm-season species in developing a management system for a range unit. Variable weather requires plant flexibility to allow adjustments for drought, "late" spring seasons and other unpredictable factors.

LIVESTOCK NEEDS

To be practical, a management plan must satisfy the needs of the livestock that harvest the forage. Livestock needs are perhaps better understood than those of the plants. Domestic animals are grazed for economic reasons — the rancher wants to profit from his operation. This means that a breeding herd or flock must produce a high percentage of offspring; animals destined for market need to gain in weight and condition while grazing.

Livestock often thrive best when not handled excessively, though many ranchers believe "the eye of the master fattens the cattle." Weight losses can result from moving or handling livestock unless the animals are accustomed to it, and unless the handling is done carefully. Most operations require gathering stock at least twice annually for branding, shipping, shearing, or moving to seasonal ranges; these moves can often be coordinated with the rotation system so as to result in little or no extra handling. "Fresh feed" periodically may appeal to grazing animals, and a move to untouched forage can result in improved livestock condition and even better rate of weight gain during the growing season; this benefit often can at least reduce detrimental effects of handling and moving.

Many operations involve breeding on the range; sires simply are turned in with the herd during the breeding season. In some cases, special pastures are used for this purpose. The size, topography and other characteristics of the range unit affect the number of sires necessary to achieve complete breeding. Animal husbandmen on many ranches find it necessary to separate their livestock by sex and age classes; for example, steers and heifers are usually kept separate and the cow-calf herd is run in separate pastures. These factors can affect the design or implementation of a management system.

Livestock have strong preferences for certain species of plants, and often, for individual plants of a species. The highly-preferred species have been referred to as "ice cream plants"; animals will heavily graze these while hardly touching equally nutritious but less palatable species. There is often a tendency for animals to return to the same individual plant in preference to another of the same species which has accumulated coarse growth from the previous season. This selective grazing is a characteristic of wildlife as well as domestic animals.

Livestock in general prefer certain areas of their range. For example, cattle tend to use heavily the areas adjacent to water, and seldom travel up steep slopes or over rough topography as long as any feed remains in the "bottoms" or "flats." In rough country, cows become "located" in a limited area, and will return to it at the first opportunity if driven away. This is particularly true of cows raised on a yearlong range unit.

RECONCILING PLANT AND ANIMAL NEEDS

The case histories in this booklet offer evidence of advantages for intensive management from the standpoint of both forage plant and grazing animal. They also show that there are problems associated with their application. The results of actual applications of intensive management demonstrate that here is a strong challenge and opportunity to couple common sense and practical experience with scientific knowledge for better rangelands and sustained livestock production.

The variety of case histories used as examples show conclusively that there is no single "best" system that is universally applicable. Every range unit must be considered in the light of the combination of conditions that affect it. A management plan tailored to each ranch or grazing allotment is the "best" answer.

Most successful grazing systems are compromises which take advantage of both plant and animal characteristics while recognizing the undeniable requirements of both. For example, plants would do better if they were never grazed during their most active periods of growth and food storage. On the other hand, livestock must have feed during these periods. Most intensive management systems therefore provide for grazing some units while resting or deferring others. As case histories show, there are many ways of making this compromise.

The National Forests

lands of many uses

SECTION II
CASE HISTORIES

CASE #1: SUMMER RANGE — DEFERRED ROTATION ON 4 UNITS

Eight Good Reasons For Range Rotation

THE WESTERN FARM LIFE
September, 1963

"TOO much grass goes to waste. Moving cattle every 30 days or so cuts back the weight gain." These are two common complaints voiced by stockmen of the rotation grazing management system.

"Not so," says Walter Ferguson, Jr., Cheyenne, Wyo., who with his father, and brother, Martin, runs 500 head of black Angus on the Green Mountain allotment in Medicine Bow National Forest.

Talking with the Fergusons in the senior Ferguson's ranch home near Cheyenne, we asked for opinions on the pasture rotation method. "Likes and dislikes" was our goal, and we found the "likes" running far ahead.

There have been Ferguson cattle on the Green Mountain allotment as long as anyone can remember, long before the 9,351-acre mountain pasture was part of the Medicine Bow National Forest. The land has been under military jurisdiction as well as federal reserve and now forest service. Walter Ferguson, Sr., 85, was born in the "grass years."

"We figure three days of good hard riding to move our cattle every 30 days from one pasture to the next," Ferguson explains, and the "move" is not just across the fence. "We move 'em slow and easy, and what little they drop in weight comes back quickly, with added gain, when they get that new grass in 'em," he continued.

Asked if it "bothered" him to see good grass still standing when the cattle are moved off pasture in mid-October, Walt Ferguson, Jr., replied simply, "It never bothers me to see grass. If it's there in the fall, I know it'll be there come spring when we need it again. We always leave grass on our private pastures."

Prior to the rotation system, the bottoms were being hit hard and the ridges got little use. After four years of rotation grazing (one complete cycle) there is plenty of grass left in the bottoms after the cattle come off. This situation has resulted in a minor problem on Green Mountain, according to Ferguson. He feels that in some of the bottoms the grass may be matting up too much.

"The cattle hit the grass when they first move in and take the early stuff. But they leave the bottoms because there's too much old grass mixed in. Then the new grass turns rank. Guess there's nothing we can do about it, though. It wouldn't do to burn it off, and we're not about to try mowing it," he explains.

The Ferguson's Green Mountain allotment is divided into four pastures of approximately 2,200 acres each. This allotment originally carried up to 800 head during the late 20's and early 30's. It was later reduced to 500 head for range protection during the middle 30's, and in 1957 the allotment was believed to be still about 50 percent over-stocked.

Fergusons and the forest service held a consultation. Would it be another range cut, or could something be worked out to benefit all concerned? A program of rotation grazing was agreed upon. The Rocky Mountain forest and range experiment station at Laramie offered to conduct research studies to evaluate the affects of the new type of management on the range vegetation. That year the forest service constructed approximately seven miles of range fence. It was decided no special water developments were needed. The wild iris in one meadow was increasing and a spraying project was planned. This job was cancelled when the meadow began to recover naturally. Given protection, the grass took over to crowd out the iris.

Today there are about 23 miles of fence, of which 15 miles is maintained by the Fergusons at their expense. They installed a water tank in No. 2 pasture, and Walt Ferguson figures it wouldn't be a bad idea to put another tank in No. 1 pasture.

One complete rotation took place from 1958 through 1961, and another round will be completed in 1965. The season is from June 1 to October 15, stocking 500 cows and calves. And, there's serious thought of increasing the number of animals. What size increase hasn't been decided. "Sure, we'd like to see more cows on the allotment," say these cattlemen, "But we're not pushing. We like all that grass, too. And, we'd hate to tip the balance. The pastures have got more and better grass in 'em than when we started five years ago."

The Fergusons agree the rotation system isn't perfect. Apparently, however, any drawbacks are more than covered by the advantages.

The major grievance is moving cattle every 30 days; not because of weight loss, but the time involved. "Especially," Walt, Jr. exclaims, "During the haying season. And then, getting the calves mothered up again can be a headache."

"But," he counters, "we don't have half as much riding in between moves. We can spend half a day in the saddle, see all our cows, and come home. Used to be on the single pasture we might ride two or three days for a good check. Last fall, for instance, it took us only one day for roundup."

The biggest advantage? Calves. More of them, and even an even crop. The Ferguson's are convinced they are getting much better coverage from the bulls. "The percentage is definitely up," Walt, Jr. emphasized.

Summing it all up, there are several major points usually cited in favor of the rotation grazing management system:

1—Desirable plant species are cropped once and given a chance to establish vigor through storage of food and regrowth. 2—Seed production on the preferred plants is improved on three of the four pastures every year—particularly the pasture grazed last each year. 3—Utilization is more uniform over each unit than in open range grazing, and young plants are better established. 4—Calf crop percentages may be higher and the calving season shorter.

5—Poorer plant species are being utilized to some extent under rotation grazing, whereas light or no use was observed on these plants under season-long grazing. 6 — Watershed values are better as the plant cover is increased by new seedlings which are established. 7 — This type of management permits deferrment of areas infested with poisonous plants until the plants are cured and safe to graze. 8—Less riding is needed to obtain distribution, resulting in less trailing and tramping damage and better weight gain for range cattle.

Asked how their father, as an old-time, open-range cattleman felt about the rotation system, when it was first proposed, the Ferguson brothers had this to say:

"He went along with it. He likes to see tall grass, too."

CASE #2: REST-ROTATION ON YEARLONG RANGE

South Coe Allotment
Lincoln National Forest
New Mexico

Permittee: Paul H. Jones, Glencoe, New Mexico

Vital Statistics
Area: 4,512 acres
Elevation: 6,100 - 7,100 feet
Rainfall: 14″ average (65% July-Sept., 30% Oct.-Mar.)
Stocking: 948 cow-months
Season: Yearlong
Operation: Cow-calf
Vegetation: Pinyon-juniper with blue grama, sideoats grama, Texas timothy, plains lovegrass and oak.

MANAGEMENT

The management plan calls for grazing three pastures each year, while resting one. Each pasture is grazed at a different season each year during the rotation. Because pastures differ in size, and because rainfall patterns affect forage production, cattle are moved to the next pasture when utilization dictates, rather than on specific calendar dates.

Improvements: Pasture fences and additional waters in each pasture had to be constructed to implement the system. In addition, juniper and pinyon were cabled on part of the allotment. While this served to increase forage production, it was not essential to implement intensive management.

RESULTS

Forage

Grazing capacity: Increased 15%
Cover: Increasing
Composition: Greater % desirable species
Utilization: More even

Livestock

Calf crop: Now approaching 100%
Calf weights: Greater after 3rd year under management
Handling costs: Slight increase
Convenience: Improved

Hindsight Recommendations

Actual trial of the management system beginning in 1960 indicates that pastures should have been fenced so that each has about the same grazing capacity. This would make management easier, but the plan is showing good results despite the unequal size and capacity of the pastures.

Forage production and plant vigor have improved with periodic deferment and rest.

Results of yearlong grazing.

CASE #3: 3-UNIT SYSTEM FOR SEASON DEFERMENT ON YEARLONG GROWING RANGE

JI Ranch
Tonto National Forest
Arizona

Through the courtesy of the author and the Arizona Section of the American Society of Range Management the following article is reproduced just as it appeared in their Newsletter of October 1964. This clear exposition of one rancher's thinking about intensive management speaks for itself.

PRACTICAL RANGE MANAGEMENT

by M. Carl Webb

(The author owns and manages the J. I. Ranch on Devils Canyon between Miami and Superior.) Ed.

Will a system of rotational deferred grazing work on a very rough, rocky range? After three years of using it, I am convinced it is the best grazing system for this ranch. Here are some of my observations on the subject:

It is my opinion that the density of the better grasses has increased, even considering the fact that two of the years had below normal summer rainfall:

1961 — July, August, Sept. = 7.85 inches
1962 — July, August, Sept. = 5.90 inches
1963 — July, August, Sept. = 12.20 inches
1964 — July, Aug., thru Sept. 8 = 8.00 inches

I believe the better browse plants, such as mountain mahogany, ceanothus, eriogonum, and hollyleaf buckthorn are holding their own in all localities and many young plants are evident in most areas.

I believe this is a system where grass can be made to grow in places where it is very difficult under a year-long grazing system. In this connection, I will have to admit that prior to this deal, I sort of believed that Sideoats Grama was a "hillside" grass; that is, it preferred the steep, rockier slopes. I have found out since that it will grow pretty good in the trail, on a flat, or right down to the edge of a dirt tank.

All of the grasses, by having a protected growing season now and then, seem to have much more vigor when it does rain, and they get a chance to grow.

Under rotation grazing, a given piece of range can withstand more intensive grazing for a given length of time. Our utilization checks bear out this point. We have made utilization estimates on Sideoats in each pasture before we moved to the next one. In the areas close to permanent water (100 yds to ¼ mile), the average has been around 35-40%. In the areas farther back (¼ mile to 1 mile), the average of the check are less than 25%. This is with the same number of cattle grazed, as under the "year-long" system.

Under this system, a person is better able to utilize the feed in the areas more remote from water. When it rains and there is abundant feed and water in these remote areas, there are enough cattle close by to move into the area and harvest this grass that might otherwise be hardly touched.

Instead of having seasonal or clockwise rotation, we have used one of the pastures only in winter and spring (Feb., Mar., Apr., & May). The other two pastures are alternated, so that each gets the summer growing season every other year. (Actually, each of these pastures get one full year's rest every other year). This possibly may have advantages because cattle do not get regulated to a set pattern and tend to hang fences to get to the next pasture.

Good trails for the moving of the cattle are very important in a rota-

tional system on such a rough range as this one.

I believe grasses do a better job of reseeding under some form of rotational grazing. When the grass produces seed, there are more cattle in a given area tromping more seed in the ground. From my observations, I believe the best native, natural reseeders here are Plains Lovegrass, Sideoats Grama, Green Sprangletop, and Cane Beardgrass.

As to the effect of this system on the cattle, the picture is not so clear cut. Our yearling weights have not picked up noticeably. We have had two good calf crops and one very poor one. However, under this system, I am able to supplement to a better advantage during breeding season and am hoping to build up and maintain a better calf crop %. We supplemented last breeding season and have an excellent calf crop this year.

Naturally, under a rotational system where all of the cattle have to be moved at least three times a year and where their distribution is controlled more or less within each pasture, there is bound to be more riding involved than probably is necessary under most year-long systems.

We still have a bull distribution system because there are too many different "homes" for the bulls. Also, the move we make in the spring is rather hard on the smallest baby calves.

The actual cash cost of labor, horses, horse feed, etc. has not increased because, by so much handling, the cattle are kept foolproof gentle and can be worked with less manpower in numbers and experience.

I am sure we saved some losses in the summer and fall of 1963 when screw worms were so bad. By having the cattle on 1/3 of the range, we were able to see them more often.

If we get this rain that is predicted for the next couple of days, the grass will drag your stirrups on the hillsides and maybe on the level if you are riding a small mule!

EDITOR'S NOTE: We wish to thank Carl for the fine article he has submitted, and we hope that it is just the first of many, not only from him, but also from other ranchers!!

Typical Range on the Tonto National Forest near Superior, Arizona

CASE #4: DEFERRED ROTATION ON 2 UNITS

Starkey Experimental Range
Wallowa-Whitman National Forest
Oregon

In the following article, reprinted by special permission of WESTERN LIVESTOCK JOURNAL, a Forest Service range researcher describes an effective but simple system of intensive management. Dr. Driscoll helped evaluate and refine the system during his assignment in the Pacific Northwest.

Range Management:

New Answers to Old Problems

New applications of proven principles pay off on Starkey Experimental Range

WESTERN LIVESTOCK JOURNAL FEBRUARY 1958

By RICHARD S. DRISCOLL
U. S. Forest Service Range Conservationist

PRACTICAL application of some good, old-fashioned range management practices has paid off on the Starkey Experimental Forest and Range. It has provided efficient use of forage and increased beef production while improving condition of the range. These are results that any rancher or range administrator should be happy to get.

The Starkey is a 27,000-acre cattle allotment on the Wallowa-Whitman National Forest in the Blue Mountains of eastern Oregon. This range was set aside in 1940 by the Forest Service for the study of grazing management on ponderosa pine summer ranges.

It is also used to demonstrate promising grazing management practices and techniques. Since that time, the range has been stocked at a conservative level with 825 head of cows and calves for a 4-month grazing season.

Grasses. Range types found on Blue Mountain summer ranges occur in mixture over the Starkey. Some 25% of the area is grassland. The major grasses are Sandberg bluegrass, bluebunch wheatgrass and Idaho fescue. Another 50% of the area is open forest range with a mixture of ponderosa pine, Douglas fir and western larch. Here, the most important forage plants are elk sedge and pinegrass.

The remaining 25% of the area consists of dense timber on steep north slopes, providing little available livestock feed.

Range improvement on the Starkey has been brought about by conservative stocking, proper season of use and a simple 2-unit rotated-deferred management system. Good distribution of cattle and uniform forage use have been obtained by old-fashioned horse sense management practices that any rancher can use, namely: Salting, water development and range riding.

Problems. One of the most difficult problems encountered while trying to improve the Starkey range has resulted from yearly variations in forage utilization. These variations were caused by fluctuations in forage production due to seasonal weather conditions.

Utilization of bluebunch wheatgrass has varied from a high of 69% to a low of 38% under the conservative stocking rate. Over the years, it has averaged approximately 50%, which is proper use on this range. Good management means having a good stand of grass left at the end of the grazing season after a good year. Under a constant rate of stocking, the range is not seriously damaged even after a bad year.

Grazing during the proper season is as important to the forage as grazing with the proper number of animals. Using the plants before they have made sufficient top growth results in reduced vigor and eventually kills them. Grazing too early in the spring before soils are firm enough results in trampling and soil compaction.

Range Readiness. Range readiness at Starkey varies as much as 30 days in successive years. Weather conditions during the spring growing period make the difference. By mutual agreement with the permittees, opening of the grazing season is set annually according to vegetative readiness and soil firmness. Range is considered ready for grazing when seed stalks of bluebunch wheatgrass are showing and soils are firm enough to support the weight of cattle.

The system of management on the Starkey has played an important role in increasing the volume of better forage plants.

Prior to 1942, the range was grazed season-long. Areas of concentration and heavy use were evident. Other areas had received little or no use. To alleviate this situation, the range was cross-fenced into two units of equal grazing capacity for rotated-deferred management. Under this system, the cattle were placed in one unit at the beginning of the grazing season; at midseason they were moved to the second unit. This procedure was reversed in each following year. Thus, the plants on half of the range were allowed to grow, gain vigor and set seed before being grazed.

Increased Production. These practices have paid off through increased forage production, higher quality forage and better watershed cover. In 1940, 56% of the vegetation on the grasslands was Sandberg bluegrass, a low-value forage plant. Bluebunch wheatgrass and Idaho fescue made up less than 10% of the vegetation. Recent inventories show that Sandberg bluegrass has been reduced to 26%. Bluebunch wheatgrass and Idaho fescue now make up nearly one-third of the grassland vegetation.

The amount of ground cover has almost doubled since 1940. Vegetation cover on the shallow soils of scab ridges has increased 127%. Although the

Starkey range is still far from being in good condition, it is definitely improving.

These major vegetation and ground cover changes have occurred as the result of rotated-deferred management. However, a planned program of salting, water development and range riding has increased the efficiency of use and promoted further range improvement.

Salt Grounds. Additional salt grounds have greatly improved distribution of cattle on the Starkey. Forage has been used more evenly. Cattle have been attracted to timbered areas of unused feed which are remote because of steep topography or distance from water. The absence of salt in other locations has prevented excessive use of areas where cattle normally concentrate.

In 1940, 26 permanent salt grounds were established on the range, one for every 1,000 acres. This number seemed adequate at the time. However, after the salting plan had been in effect for several years, many remote timbered areas still were receiving little or no use. In addition, sore spots were developing in areas around the permanent salt grounds because of heavy game and cattle concentrations.

The range rider became interested in attempting to improve cattle distribution by salting. He abandoned many of the permanent salt grounds and constructed numerous temporary, low-cost salt grounds by using a sound tree stump, a 10-inch spike and the hole in the salt block.

Moving Salt. He progressively moved the salt from areas of adequate use to areas of unused forage. This resulted in use of forage where cattle never previously ranged. The increase was only 10-15%, but it meant decreased use in other areas which were being heavily used.

By 1955, 62 of these temporary salt grounds had been established, one for every 400 acres. Thus, cattle distribution was materially improved with very little additional cost to the ranchers.

Water is one of the most useful tools in controlling the distribution of cattle on our summer ranges. The development of small springs and, in some cases, seeps and underground water has changed the Starkey from a poorly-watered range to a well-watered range.

Five Springs. In 1940, there were five developed springs on the range. Two streams contained season-long water. In another, the flow was only intermittent after midseason. In many cases, cattle had to trail as far as 2 miles to water.

These springs were surrounded with dust beds. Extreme overuse of forage was prevalent in their vicinities. At the same time, other places on the range were receiving little or no cattle use because of lack of water.

The initial water improvement program on the Starkey began with development of springs with a known supply of season-long water. Fifteen log through developments were constructed. The average cost of these improvements, including trough, headbox and pipe installation, was $150.

Colville Cribs. Additional watering places were made by constructing 10 Colville crib-type developments. These structures cost approximately $75 each. They consisted of dugout seeps with a log dam. Eight more developments were made by constructing small reservoirs. Although the reservoirs cost $90-$100 each, they were located in areas where no other type of development could be constructed and where water was necessary to obtain good use of the forage.

In addition to these developments, 27 ponds have been made on the Starkey to supply a few head of cattle with water for 30-60 days. These ponds, constructed with bulldozers, cost $10-$15 each. They were developed in canyon bottoms, on hillsides or near ridgetops.

In the canyons, underground water was brought to the surface. On hillsides and near ridgetops, patches of water-loving vegetation were used as indicators for possible ponds. When water from these ponds is gone, the forage in surrounding areas has usually been properly used.

Water Holes. By 1955, there were 60 places on the range where cattle could get water. There is no place on the range now where they have to travel more than ¾ mile to water. After the major portion of the water development program was completed, cattle had to be driven out of areas where previously they would not stay.

This experience indicates that on any range unit, all potential water should be developed. Many watering places for a few head of cattle provide much better distribution than a few watering places for a large number of cattle.

Experience at Starkey also has shown that success in getting good distribution of cattle and uniform forage use largely depends on competence of the range rider. A good range rider knows the habits of cattle and how they use the country. He also understands the importance of basic grass and soil resources. He knows if there is enough forage in an area to warrant development of a small spring or if a salt ground would be just as effective in getting better distribution.

Planned Riding. The chances for success in range riding are greatly increased by having a plan. This plan, developed with the rider, should consist of frequent periodic visits to areas around the range to check on forage use. Included in the plan should be regular visits to water holes and salt grounds to investigate water and salt supplies.

Even if cattle are initially distributed in small groups over the range, they soon drift to areas of natural concentration. When the rider inspects water, salt and forage conditions, he should gather 50-75 head of cattle from the concentration areas and take them with him. These cattle can be trailed to more remote areas of unused forage. Some of them will not stay. Eventually, however, a sufficient number will remain in the area to make good use of the forage.

Although good range riding gets good distribution of cattle and uniform forage use, the riding plan, as well as the management plan, has to be revised annually to fit existing forage conditions.

Salt Use. During 1955, cattle on the Starkey used 400 lb. of salt in one remote area where previous salt use had been 200 lb. Bluebunch wheatgrass was used 50%; elk sedge was used 25%. In previous years, the use of these two species had averaged 30% and 10%, respectively. A good range riding job was directly responsible for the increased use.

None of the management practices discussed—rate of stocking, season of use or distribution of cattle, which includes salting, water development and range riding—will independently improve any range unit. They have to be integrated into a well-planned management program in order to be successful in getting the most efficient use of range.

Development of such an integrated mangement plan has increased the amount of bluebunch wheatgrass and Idaho fescue on the Starkey from three to six times since 1940. The less desirable forage plants, such as Sandberg bluegrass, have been reduced by half. Ground cover has almost doubled over this 15-year period.

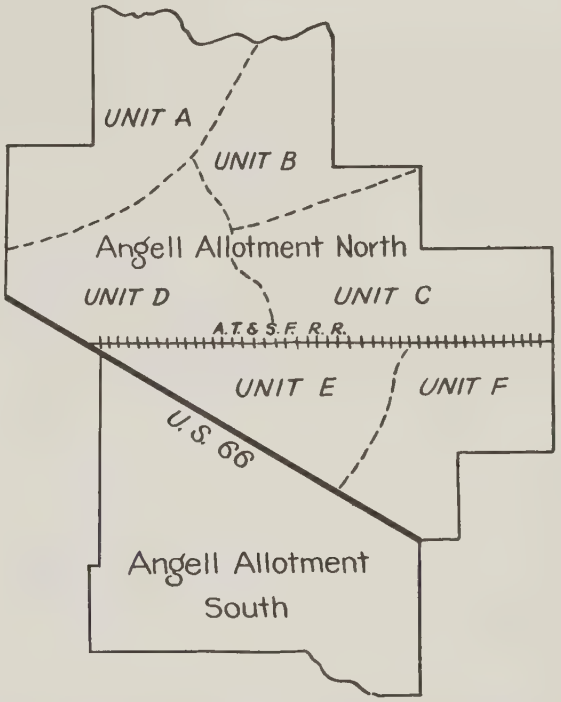
The Payoff. The payoff comes through more beef production. Bigger calves come off the range at the end of the grazing season. In 1955, calves under moderate grazing gained an average of 196 lb. for the 4-month season. Calves under heavy grazing gained only 180 lb. They are in better flesh and grade higher than calves produced on the range 10 years ago. Cows made 75 lb. gain under moderate grazing and only 55 lb. gain under heavy grazing.

Any rancher can reap the benefits of range forage improvements like these obtained at Starkey by adapting these management principals to his own conditions.

CASE #5: REST-ROTATION ON 6 UNITS WITHOUT DIVISION FENCES

Angell Allotment
Coconino National Forest
Arizona

Permittee: William S. Porter



Vital Statistics
Area: 29,583 acres
Elevation: 5,800 - 6,200
Precipitation: 15″ (40% July-Sept.,
20% Oct.-Dec.,
30% Jan.-Mar.)
Soil: Derived from cinders and limestone
Terrain: Rolling
Vegetation: Pinyon-juniper with blue grama, three-awns and galleta
Operation: Cow-calf
Stocking & Season: 200 5/31-12/31 North
50 yearlong South

Typical terrain on the Angell Allotment — Coconino National Forest

MANAGEMENT

Except for the fences along the railroad and highway rights-of-way, pasture divisions are "imaginary" lines. These unfenced lines divide the north portion of the allotment into 6 units of approximately equal grazing capacity. Five of these units are grazed in succession for about 5 weeks each year; one unit is rested completely each year. Each unit is used at a different time in successive years.

A well at the ranch headquarters is the only permanent source of water on the allotment. Water must be hauled from there to portable tubs strategically located in the grazing areas. This is the major control of use, though both salting and riding are used to hold the cattle on areas to be used.

No diagram of the rotation system is shown because stocking and seasons have varied somewhat in the past; current plans call for integrating the south pasture into the rotation to enable juniper control and seeding. In addition, two other allotments are used to round out the yearlong operation in connection with private land, and intensive management is being extended to these allotments.

RESULTS

Some comments from Mr. Porter's letter to the District Forest Ranger:

> This plan is working out fine with us. We have to haul water to our stock and can keep the cattle within a certain area. We can move the water to different locations to keep from overgrazing any particular part of the range. I feel that by doing this we keep in fresh range and the cattle don't have to travel far to get feed.
>
> We gain approximately twenty-five to thirty pounds each on the weight of our calves. We find that the cost of pumping our deep wells and hauling our water is quite expensive. The increase in the growth of the calves helps to ease this burden.
>
> . . . We are well pleased with the program we have working with you. Most all of our range is in very good condition and the cattle are doing well . . .

Intensive management is enabling maximum realization of benefits from 6,600 acres of juniper control work done since 1955. No change in forage composition has been observed as yet, but density and forage production have increased markedly.

Water troughs are moved frequently to help control use

CASE #6: REST-ROTATION ON SEEDED RANGE IN CONNECTION WITH PINE PLANTATIONS

A-1 Allotment
Coconino National Forest
Arizona

Permittee: O T Cattle Co.

Vital Statistics
Area: 5,277 acres
Rainfall: 20″
Elevation: 7,000 ft.
Operation: Yearling cattle
No. and Season: 400 5/15 - 10/15

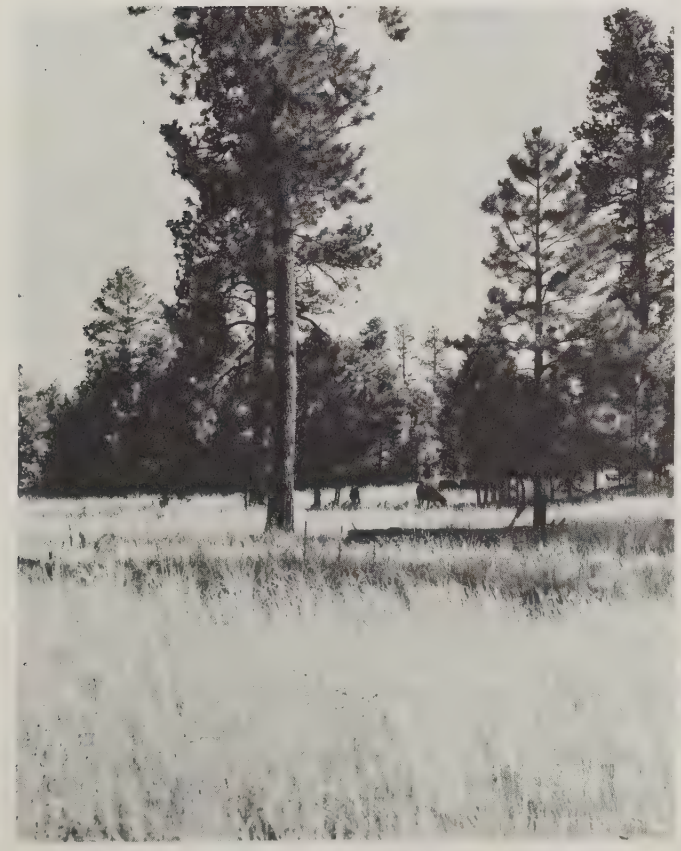
Range Vegetation:

17% — Ponderosa pine area burned by wildfire seeded to crested wheatgrass and yellow sweetclover; Arizona fescue is coming in naturally.

19% — Ponderosa pine area burned by wildfire (not seeded). Mountain muhly and Arizona fescue with other species of grass and weeds have occupied the site.

64% — Ponderosa pine, much of it very dense, with mountain muhly, Arizona fescue and pine dropseed.

Site preparation for pine planting being conducted in conjunction with rest-rotation management on A-1 Allotment



Pulpwood cutting helps thin the dense young pine stands

Salt grounds are moved frequently to prevent excessive trampling.

MANAGEMENT

Following the highly successful seeding of the Belle Spring burn, the range was divided into 5 units; these were later subdivided and additional area was added to the allotment so that 10 pastures were available for use. These have been grazed for approximately 5 years so that one unit was completely rested and most of the remainder deferred to various extents. Each unit was grazed at a different season in successive years. Only one or two units were used at any given time; steers spent only 2 weeks in some pastures because of the relatively small area.

The area was fenced into small units. The cattle were concentrated in these units to obtain uniform utilization and to minimize selective grazing of the more palatable grasses and concentration on the "easier" areas. In pastures which include both seeded and native species, the latter were not properly used until cattle were forced to graze them by concentration in a small unit. Under moderate seasonlong grazing, crested wheat developed "wolf plants" at the expense of other plants which were grazed repeatedly during the season.

An additional objective of the small subdivisions was to provide units where pine plantations could be established and protected without closing the entire allotment to grazing.

RESULTS

Excellent distribution was achieved under the system, and utilization patterns were normal for range conditions. However, frequent moves of cattle necessitated by the 10-pasture plan proved to be inconvenient for the rancher and may have affected weight gains slightly.

Even in normal concentration areas around waters, density of desirable (seeded) species is holding up well. Natural recovery of grasses on the unseeded burned area has been striking; desirable species are increasing.

CHANGES

To simplify livestock handling, the units could be consolidated into three. One would be rested annually, another grazed during the first half of the season and the third grazed in the last half. This procedure would provide total rest for a greater area each year, but would be less adaptable to a program of pine planting.

CASE #7: FLEXIBLE ROTATION SYSTEM SHOWING LIVESTOCK BENEFITS

Pasture 12, Allotment 7
McKenzie National Grassland
(Custer National Forest)
North Dakota

Permittees: F. K. Goodall and Rae A. Hendrickson

Vital Statistics
Area: 3,600 acres
Rainfall: 15″ (75% Apr.-June,
25% Oct.-Dec.)
Elevation: 1,850 feet
Operation: Cow-calf
Stocking: 1,447 animal months
Season: 5/15-12/15
Vegetation: Rolling grassland, western wheatgrass, blue grama and needlegrasses

MANAGEMENT AND RESULTS

Management and results are described in this statement by the users:

> We have a four summer pasture rotation system. One of these consists of approximately 250 acres of crested wheatgrass, which we use for the early part of our grazing season — May and into June. This spring relief gives our other native pastures a chance to make a good growth. From the spring pasture, we rotate into other units, depending on which pasture is in the best shape from the season before. We remove the stock from each unit when date of enough use is reached.
>
> We think our range condition has improved tremendously under rotation grazing. We also are definitely raising more pounds of beef. In 1962 the steer calves averaged 24 pounds heavier than the previous year, and the heifers 18 pounds heavier than the previous year, when the rotation was not practiced.
>
> We feel that rotation grazing is the only way to manage summer grazing. We have better grass and more of it. The stock are also more concentrated for breeding, and calves all come at one time, which is a big advantage.
>
> Rae A. Hendrickson
>
> F. K. Goodall

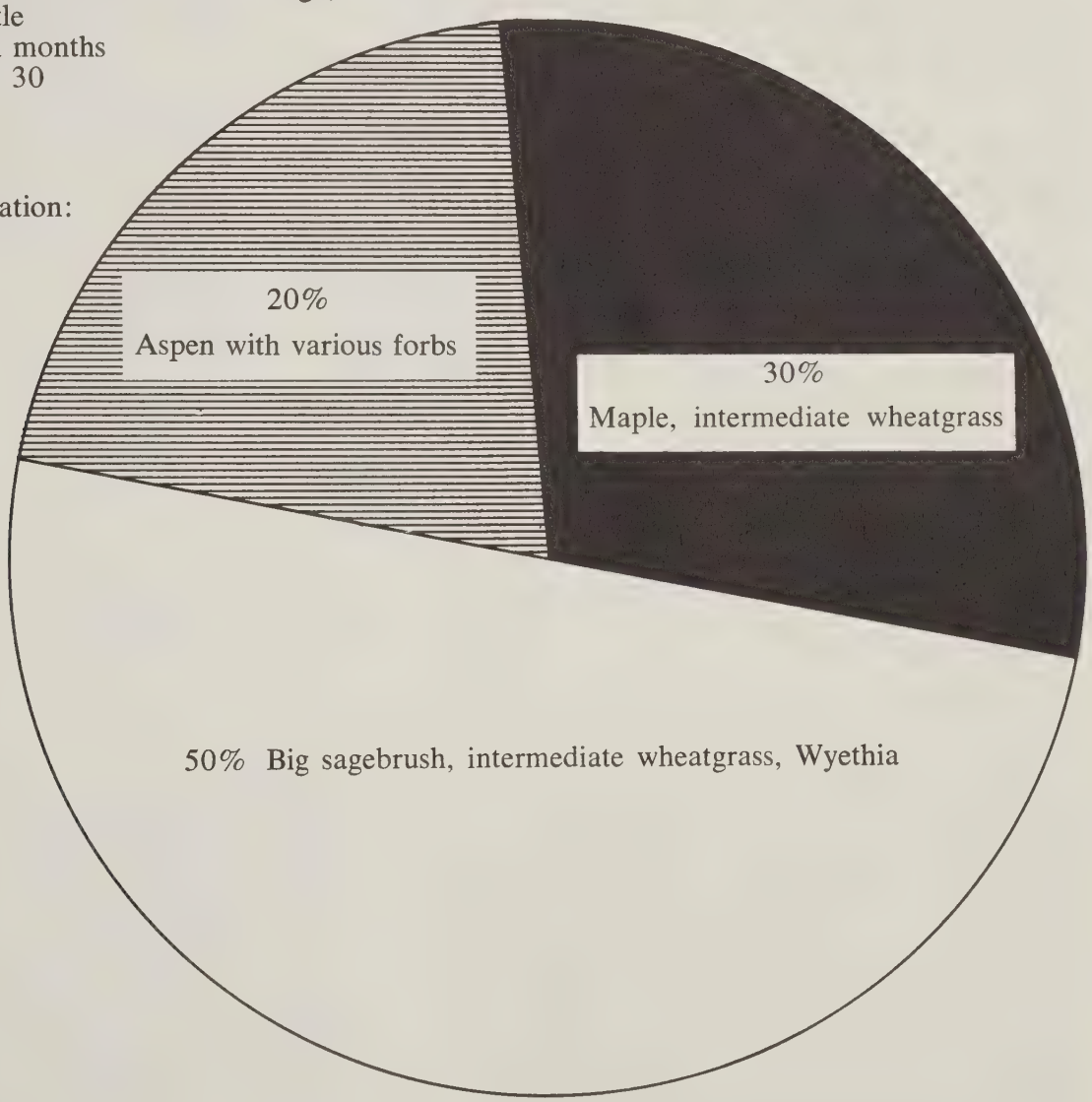
CASE #8: REST-ROTATION SYSTEM COUPLED WITH CONTROL OF NOXIOUS PLANTS

Cub River Allotment
Cache National Forest
Idaho

Permittees: Cub River Assn., A. H. Beckstead, President

Vital Statistics
Elevation: 5300 - 8000′
Rainfall: 29″ (50% Jan.-Mar., 20% Apr.-June, 10% July-Sept., 20% Oct.-Dec.)
Area: 24,000 acres (8,700 acres suitable range)
Class of livestock: Cattle
Stocking: 3,839 animal months
Season: June 11 - Sept. 30

Vegetation:



MANAGEMENT

Separate but similar rotations are carried out on two divisions of the allotment. The Cub River Division has six pastures and the Sugar Creek Division has four (see diagram of rotation). Each pasture is rested for two successive years out of eight to facilitate grass recovery after competing vegetation (Wyethia) is controlled by spraying with herbicides.

Each pasture receives deferment periodically. Because of elevation differences that affect range readiness, Units 1 and 2 are used either early or mid-season, while Units 3 and 4 are used either mid-season or at the end of the season.

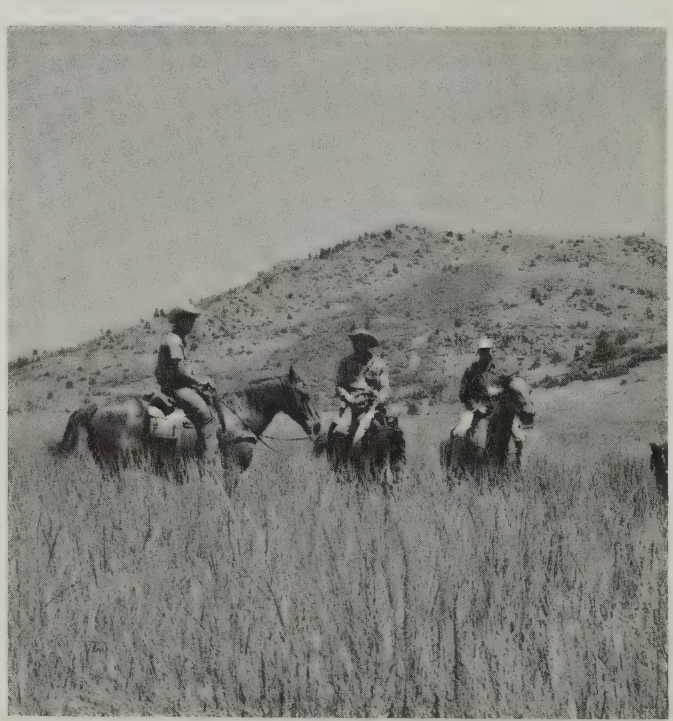
System of Use (South Portion of Allotment)				
Year	Range Units			
	1	2	3	4
1960	Rest and Spray	Graze (1st)	Graze (2nd)	Graze (3rd)
1961	Rest	Graze (1st)	Graze (3rd)	Graze (2nd)
1962	Graze (1st)	Rest and Spray	Graze (2nd)	Graze (3rd)
1963	Graze (1st)	Rest	Graze (3rd)	Graze (2nd)
1964	Graze (2nd)	Graze (1st)	Rest and Spray	Graze (3rd)
1965	Graze (1st)	Graze (2nd)	Rest	Graze (3rd)
1966	Graze (2nd)	Graze (1st)	Graze (3rd)	Rest
1967	Graze (1st)	Graze (2nd)	Graze (3rd)	Rest

RESULTS

Cattle handle well under the system, but more time is now spent in handling livestock. Forage production has increased spectacularly where this management system has allowed protection of sprayed areas.

Permittee Alvin H. Beckstead has this to say: "In my opinion, the cattle have done much better under this new type of range management than under the old. We feel that in the future instead of taking reductions on our permits, we will have ample feed and still be able to build up our allotment."

Head of Station Creek on Cub River Allotment, August 1960 — two months after spraying with 2, 4-D to kill Wyethia. Grass production - about 400 lbs. per acre



July, 1962, after spraying and two years rest. Grass production — 1900 lbs. per acre.

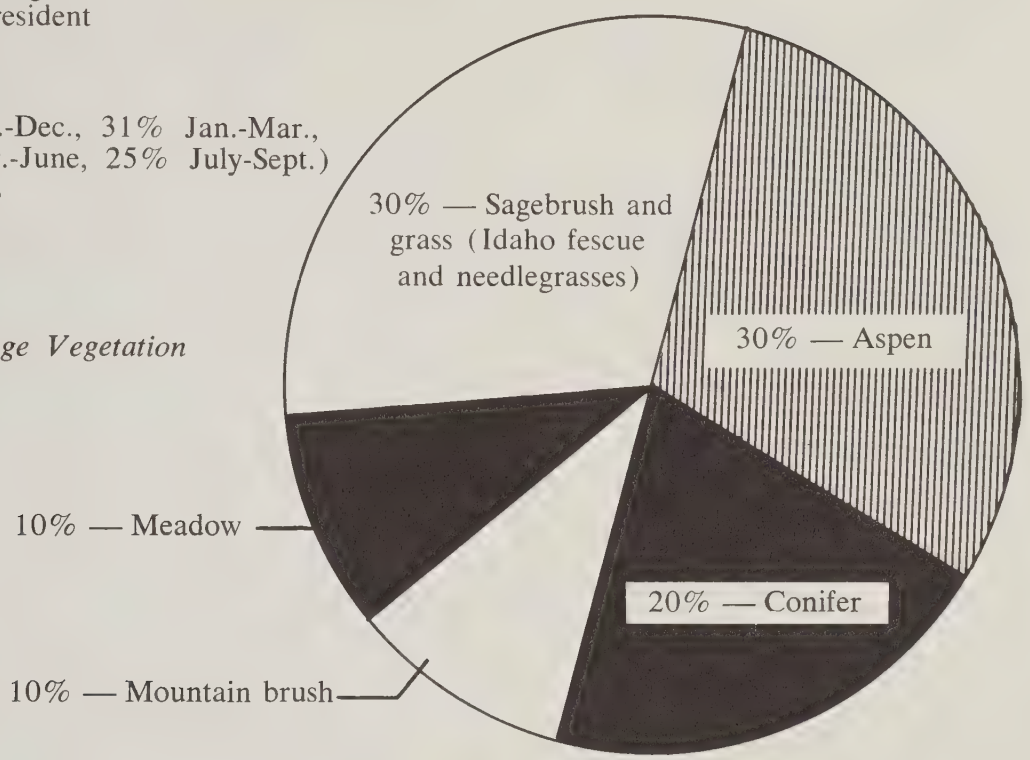
CASE #9: 4-UNIT REST-ROTATION WITH STEERS AND COWS

Bridge Creek Allotment
Caribou National Forest
Idaho

Permittees: Bridge Creek Grazing Assn.
Charles Tingey, President

Vital Statistics
Elevation: 6500 - 7300′
Precipitation: 17″ (28% Oct.-Dec., 31% Jan.-Mar., 16% Apr.-June, 25% July-Sept.)
Operation: Cow-calf and steers
Season: 6/11 - 9/30
Stocking: 1290 animal months

Range Vegetation



MANAGEMENT

In this modified rest-rotation system of grazing, one pasture is rested each year and another is deferred annually. Steers remain in one unit for the full season while cows with calves graze one unit in the first half of the season and another in the last half.

Year	*Unit 1*	*Unit 2*	*Unit 3*	*Unit 4*
1	A	B	C	D
2	B	C	D	A
3	C	A	D	B
4	D	B	A	C
5	D	C	B	A
6	A	D	C	B
7	B	D	A	C
8	C	A	B	D

A. Steers grazed entire year
B. Grazed by cows and calves late part of season
C. Grazed by cows and calves early part of season
D. Rested

RESULTS

Herbicide spraying of sagebrush and Wyethia have combined with management to produce improved range condition. Density, composition and forage production are showing upward trends. Livestock weights have increased under this system of management. Thirteen (13) miles of fence and ten (10) new water developments were necessary to implement management.

Asked for his comments, Mr. Tingey wrote:

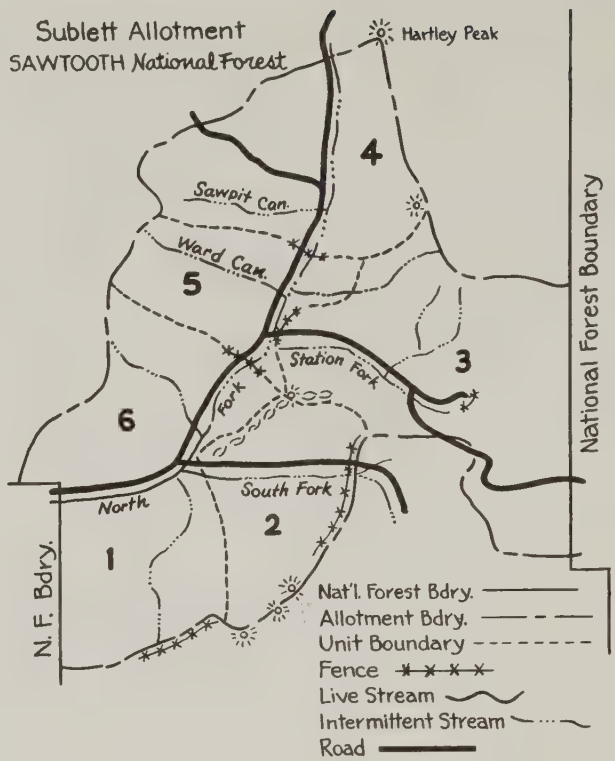
> In order to accomplish this plan we took non use of 25% of our cattle but when the program is completed, we should increase this number. The cost of handling livestock is about the same.
>
> Fencing is the main disadvantage. We are in a snow country, and we have a lot of fence repair. There is also a disadvantage in moving cows and calves from one unit to the other and getting them settled down. There is a big advantage where we run steers in smaller units. The cattle don't travel as much but settle down and do better. We have less riding or herding expense in the unit system, so that offsets the extra fencing.
>
> Our plan was to increase forage, and we have certainly done this. This means we will be able to increase beef production, increase feed for game and preserve our watersheds.
>
> We have had fine cooperation between forest officials and permittees and this is necessary for a program of this kind.

CASE #10: DEFERRED-ROTATION SYSTEM MODIFIED FOR ELEVATION DIFFERENCES

Sublett Allotment
Sawtooth National Forest
Idaho

Permittees: Robert C. Wake and
Raft River Cattle Co.,
Malta, Idaho

Vital Statistics
Area: 16,280 acres
Elevation: 5,500 - 7,500 feet
Rainfall: 12″ (15% Oct.-Dec.,
50% Jan.-Mar.,
30% Apr.-June,
5% July-Sept.)
Livestock: Cattle
Season: 6/16-8/30
Stocking: 1,200 animal months
Range Vegetation
70% Sagebrush — grass (Bluebunch and western wheatgrass)
15% Open grassland (Bluebunch wheatgrass, Idaho fescue)
15% Conifer and Aspen (Bluegrass, geranium)



Note use of spur fences combined with natural barriers to control drift between units.

MANAGEMENT

Prior to beginning management on a deferred-rotation basis, the grazing season was shortened by one month in the spring and 1½ months in the fall. Total animal months use were reduced from 3,300 to 1,200 to bring use in line with estimated grazing capacity.

Two units at higher elevations are never used during the first part of the season because range readiness is not reached by the opening date of the season. Water is hauled to much of the allotment. Its placement, plus concentration of cattle in one unit at a time, enables even utilization in each pasture. Cattle are moved to the next unit in the rotation as proper use is reached.

	1961	1962	1963	1964	1965
Unit 1	First	Sixth	Second	Third	First
2	Second	First	Third	Fourth	Second
3	Third	Second	Fourth	Fifth	Third
4	Fourth	Third	Fifth	Sixth	Fourth
5	Fifth	Fourth	Sixth	First	Fifth
6	Sixth	Fifth	First	Second	Sixth

RESULTS

Vigor and density of forage is improving as distribution and utilization have become more even. Death losses have decreased; with improved range condition cattle are not taking tall larkspur.

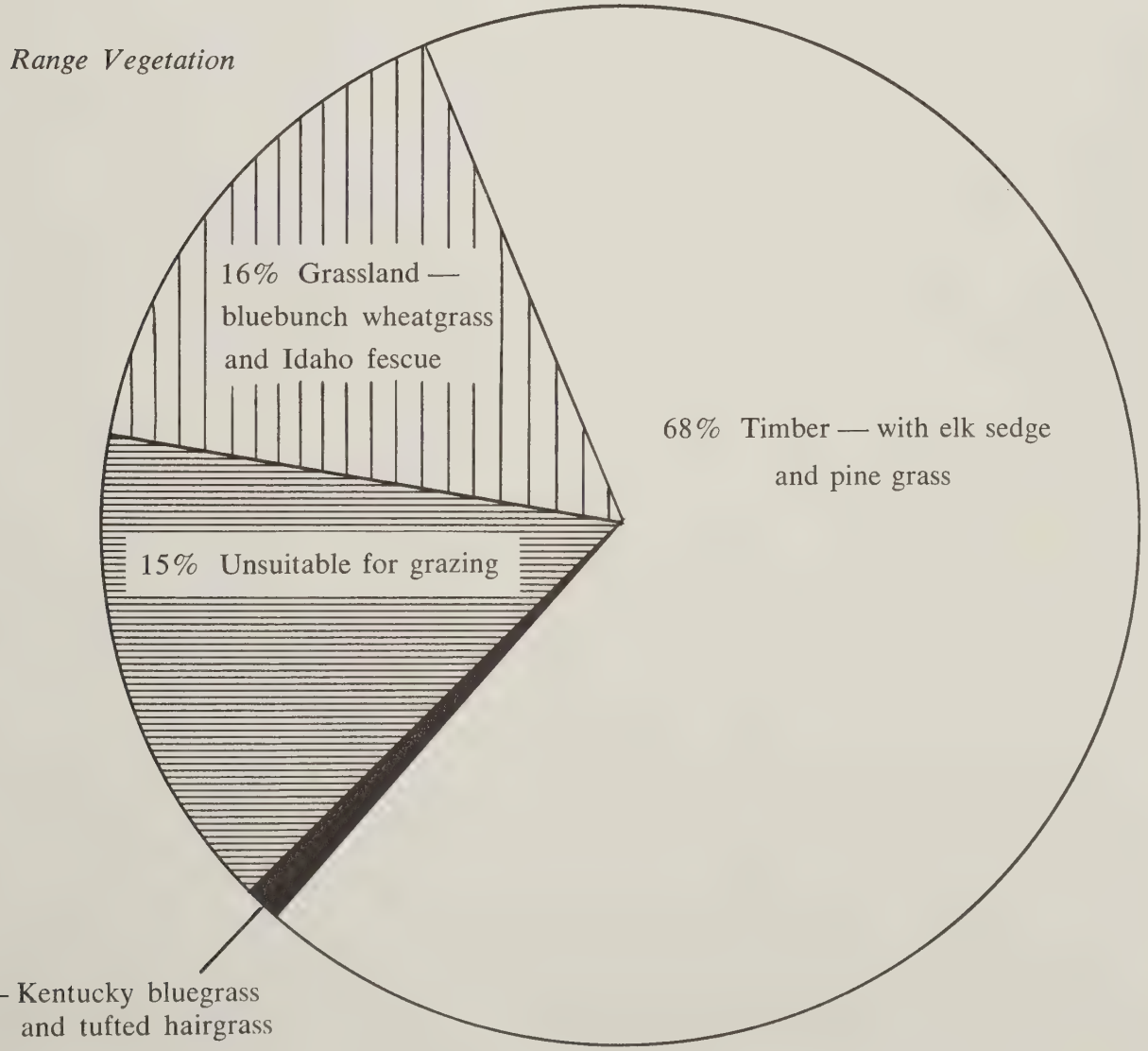
Handling costs amount to 83¢ per cow month for rider salary and salting. Fall roundup is easier and less time consuming because cattle are concentrated in a single small area.

CASE #11: 3-UNIT DEFERRED-ROTATION SYSTEM

Camp Creek Allotment
Wallowa-Whitman National Forest
Oregon

Permittees: Ernest Hudspeth, Albert Defrees and Fred Miller,
Baker, Oregon

Vital Statistics
Area: 15,942 acres (total)
Elevation: 4,200 - 6,000 feet
Rainfall: 20″ (29% Oct.-Dec.,
27% Jan.-Mar., 28% April-June,
16% July-Sept.)
Operation: Cow-calf
Season: 5/16-10/15
Stocking: 1,285 animal months



MANAGEMENT

Divided into three pastures, the Camp Creek Allotment has been under simple deferred-rotation management since 1958. Deferment is given two pastures each year; each unit is grazed during a different part of the season each year of the rotation cycle. In practice, one unit has been rested for a full season to enable protection of seeded areas.

Twenty-two (22) miles of fence (including some allotment boundary fences) and twenty (20) water developments were necessary to put this former sheep allotment in shape for deferred rotation management. Costs totaled almost $20,000, most of which was contributed by the permittees.

Year	Dry Creek	Pinus Creek	Red Hill	Pasture	Overall Season
1958	5/16-7/31	8/1-10/12	Rested	10/13-10/15	5/16-10/15
1959	9/1-10/12	6/16-8/31	5/16-6/15	10/13-10/15	5/16-10/15
1960	5/16-7/15	7/16-9/13	9/14-10/12	10/13-10/15	5/16-10/15
1961	7/16-9/15	9/16-10/15	5/16-7/15		5/16-10/15
1962	8/1-10/15	5/16-7/31	*Rested		5/16-10/15
1963	7/16-9/15	9/16-10/15	**5/16-7/15		5/16 10/15
1964	7/1-8/15	5/16-6/30	***8/16-9/30		5/16-9/30
1965	9/1-10/15	7/1-8/31	5/16-6/30		5/16-10/15

*Rested because of seeding project.

**Seeding was fenced so that rest of unit could be used.

***Off date due to deer hunters disrupting proper distribution and utilization.

RESULTS

Based on observations of forage production and utilization permitted use has been increased 10% since deferred rotation was put into effect. In addition, calf weights and calf crops have increased.

Albert Defrees, permittee on the Camp Creek Allotment, wrote: "The vegetation has improved or remained in a high state of productivity since the deferred rotation grazing was put into practice . . . weights of the brood cows and calves are better than the continuously grazed pastures . . . A noticeable improvement in the control of weeds has been one strong advantage.

"There is a larger handling cost due to the increase in the number of times necessary to change the cattle because of the added number of pastures. However, this is easier control due to the smaller acreage in each pasture; observation of animals is easier.

"The increase in the miles of fence has been of some disadvantage due to increased maintenance.

"Water and salt are the most important tools in obtaining good distribution of livestock . . .

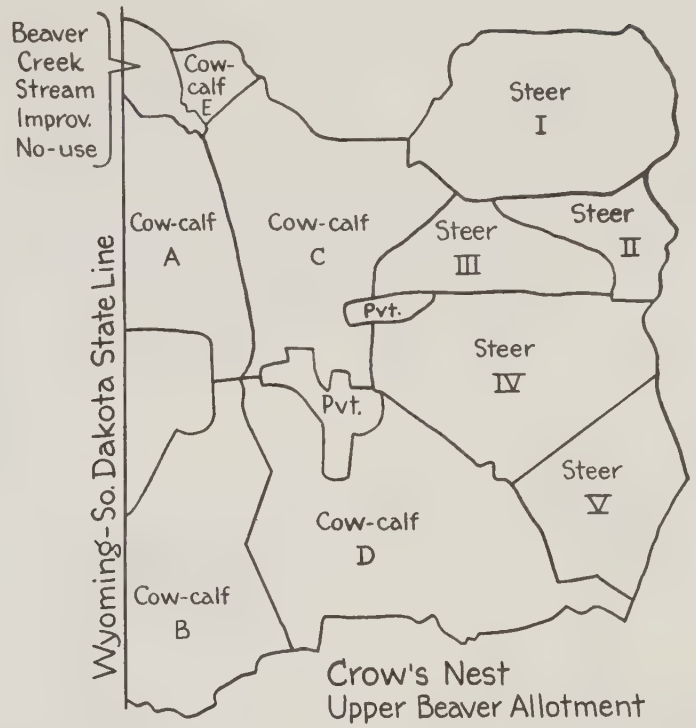
"Dates of pasture change should be worked out to fit the best interest of the range and sometimes the convenience of the rancher. We have found that it is sometimes necessary to change pastures at inconvenient times. All must stay flexible to mold to weather and unusual season conditions."

CASE #12: REST-ROTATION ON 5 UNITS — WITH FLEXIBILITY

Crow's Nest — Upper Beaver
Black Hills National Forest
South Dakota

Permittees: Beaver Creek Cattle Association
Don Baldwin, President
Newcastle, Wyoming

Vital Statistics
Area: 37,500 acres (includes 13,000 non-suitable)
Elevation: 5,500 - 7,000 feet
Precipitation: 15″ (3% Oct.-Dec., 10% Jan.-Mar., 50% Apr.-June, 37% July-Sept.)
Operation: Cow-calf and steers
Season: 6/11-9/30
Stocking: 6,489 animal months
Range Vegetation
83% conifer-aspen (sedge and Danthonia)
17% grassland (bluegrass and pine dropseed)



MANAGEMENT

The allotment is divided into two ranges — one for cows and calves and another for yearlings. Each range has 5 units. Each unit received complete rest one year out of 5 and is grazed at a different time each of the other 4 years. Pattern of rotation and season of use is adjusted as required by water availability and forage utilization. The system is flexible.

Management was designed to get better distribution by forcing use under timber types. Faced with range condition that indicated a needed 30% reduction in use, the Forest Service and permittees cooperated to construct 35 miles of fence and 90 small water developments at a cost of nearly $40,000. Permittees contributed over $8,000 of this amount. Thirty-five hundred (3,500) acres were sprayed with herbicide at a cost of $2.74 per acre to increase grass production.

RESULTS

Instead of the 30% cut contemplated before intensive management went into effect, stocking has been increased by 10%. Density of ground cover has improved. Composition is better (desirable plants have increased 80% while poor forage plants decreased 57%). Forage production is up 500 to 800%, and utilization is moderate to light in the open parks once heavily overused.

Calf crops have increased while death losses have dropped. Now, yearlings are gaining 15 to 20 pounds more per year.

Mr. Baldwin's observations from the rancher's standpoint indicate his satisfaction with intensive management on the Upper Beaver Crow's Nest:

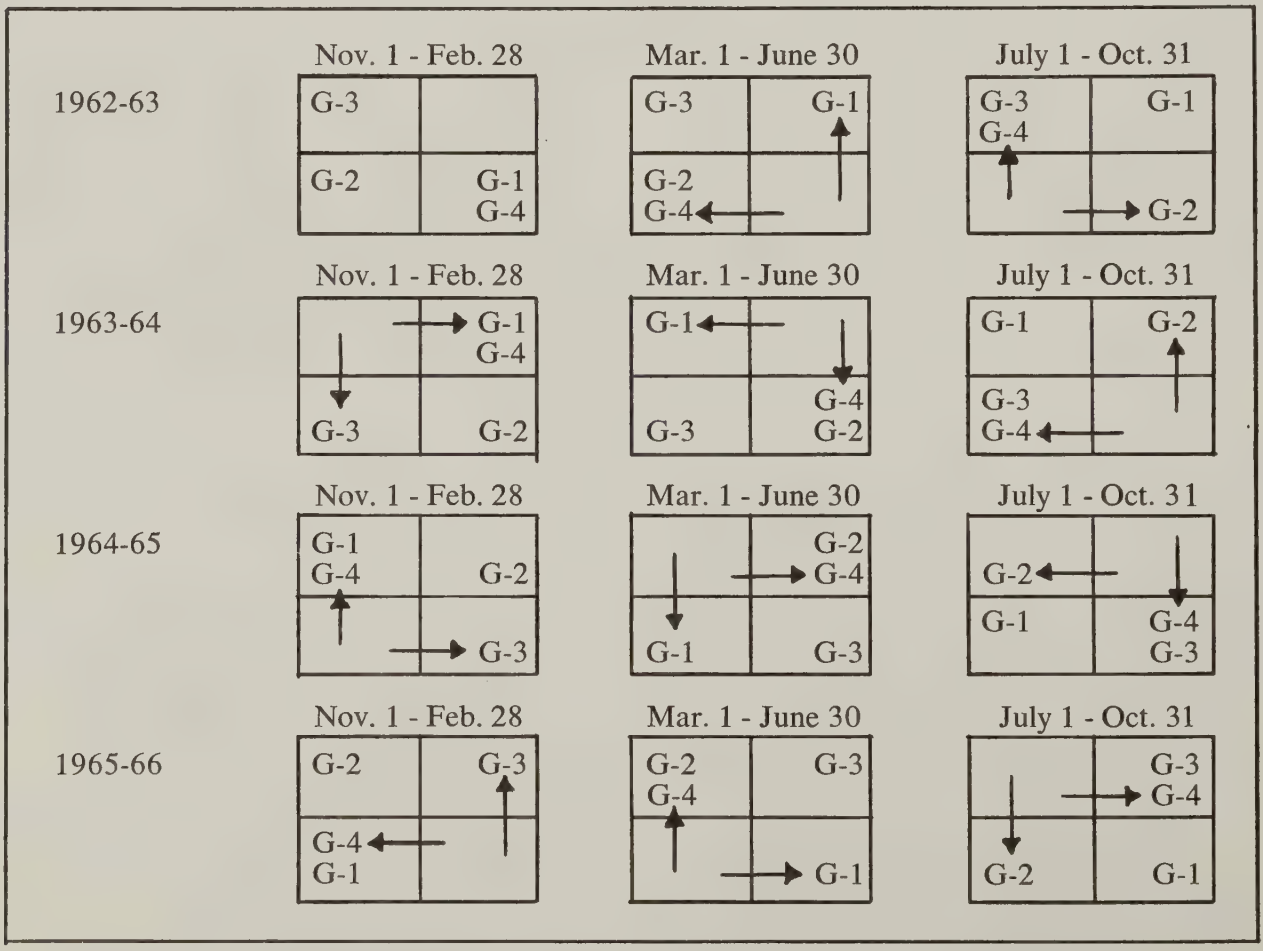
> "I would like to state that this year our range is in better shape than ever before. I believe that this year we will leave 50% or more of the forage on the ground at the end of the season. As you know, this is quite a change from a few years back before our range improvement program when we were faced with a 30% reduction in cattle numbers.
>
> "I would say that as a result of our cross fences and rotation grazing we have a slight cost increase in fence maintenance and movement of cattle. I would go on to say that this is so small in view of the benefits gained that it is hardly worth mentioning.
>
> "As a result of our fine range improvement I would say that we have already been repaid for our time, effort, and money and with proper future management we have a fine grazing future to look forward to.
>
> "I am not much of a writer but one look at our cattle in the fall and the condition in which we leave our range is enough to convince anyone that our cooperative efforts with the Forest Service have not been in vain."

CASE #13: DEFERRED-ROTATION ON YEARLONG RANGE — CONTROLLED EXPERIMENT

Ranch Experiment Station
Texas Agricultural Experiment Station
Sonora, Texas

Dr. Leo B. Merrill, Range Scientist at Texas Agricultural Experiment Station, Substation No. 14, has developed a four pasture deferred rotation system that is highly recommended for use in the Edwards Plateau area of Texas. Unlike other case histories presented in this booklet, the results described below were obtained not on a full-scale ranch operation, but on carefully controlled experimental pastures. As a proven alternative to yearlong grazing, this approach to management deserves consideration for use in other areas.

Vital Statistics
Elevation 2,400 feet
Rainfall: 22.2″, (19% Oct.-Dec., 14% Jan.-Mar., 34% Apr.-June, 33% July-Sept.)
Vegetation: Liveoak grassland, with curly mesquite, sideoats grama, cane and little bluestem. Other browse species are mixed with liveoak and annual weeds.



Four groups of livestock are used, each group constituting 43 animal units per section of use:

Group 1
Group 2
Group 3
Group 4 (Excess)

MANAGEMENT

For the first eleven years of the study each pasture was grazed with 43 animal units for 12 months and rested 4, providing 32 animal units per section over a 16 months period. Range improvement was so striking that stocking was increased in order to obtain proper grazing use. Now, each pasture is grazed at 43 animal units per section for 8 months, at 86 animal units for 4 months, and is rested 4 months. This provided 43 animal units per section over a 16 months period. Cattle, sheep and goats are grazed in the experimental pastures.

"G-1, G-2, G-3 and G-4" represent groups of livestock, each of which constitutes 43 animal units per section, as shown in the diagram. Here's how the system works: From 11/1/62 to 2/28/63, the pasture at the lower right is carrying 86 animal units per section for 4 months, while the pasture at the upper right rests and the other two carry 43 animal units per section. On 3/1/63, Group 1 moves to the upper right pasture and Group 4 to the lower left, allowing the lower right pasture to rest for the ensuing 4 months while the lower left pasture has a concentration of 86 animal units and the other two 43 animal units per section. On 7/1/63, Group 4 moves to the upper left pasture and Group 2 to the lower right and the lower left pasture rests for 4 months and so on around.

RESULTS

Pastures grazed under the deferred rotation system at 43 animal units per section are still making rapid improvement. Pastures stocked at 32 head per section and grazed continuously over the same period are improving much more slowly, and have warranted no increase in stocking.

Per acre production of livestock is significantly greater on the deferred-rotation pastures than on continuously grazed pastures stocked at 32 and 48 animal units per section. For example, cattle weight gains averaged 22.04 lbs. per acre while gains were 14.6 and 17.1 on pastures stocked at 32 and 48 animal units per section respectively. Gain per head also favored the deferred rotation pastures; 200 pounds were gained as compared to 175.6 and 137 on the 32 and 48 units per section pastures. Dr. Merrill believes that even greater animal response would have been shown if breeding animals had been used rather than dry animals.

In addition, 10 to 12 units of deer per section are using the rapidly improving rotation pastures while none are using the continuously grazed pastures stocked at 48 livestock animal units.

Other Systems to be Considered

Other deferred rotation systems considered applicable to yearlong ranges on the Edwards Plateau area have not been tested at the Sonora Station, but these are similar to the 4-pasture system.

Under the 3-pasture system, each unit is rested 3 months and grazed six months, delaying the rest period for three months in successive years.

With the 2-pasture (South African Switchback) system, the entire herd is placed in the first pasture for 3 months, on the second pasture for 6 months, then on the first pasture for 6 months, next on the second pasture for 3 months.

SUMMARY

The case histories presented here are examples of how ranchers and range managers have applied intensive management to meet plant and livestock requirements on individual range units. Because no two ranges are exactly alike, no two management plans are identical. Basic principles are the same, however, and their sound application has produced satisfying results. Results differ in degree, partly because economic and practical considerations sometimes require compromise with the "ideal" system.

Inherent differences in individual ranges and in livestock operations preclude making a balance sheet, but some generalizations can be drawn from the case histories. Several important advantages can be seen in intelligently applied intensive management systems based on plant and animal requirements:

1. Better distribution of livestock use results from concentrating animals in limited areas; utilization is more uniform.
2. Only small areas need be covered by riders to check or round up livestock.
3. Weight gains on individual animals have resulted from intensive management on some units.

4. Calf crops often improve because breeding opportunities are increased and mother cows are in better condition. Uniformity of calf size is another money making advantage.
5. Range and livestock withstand drouth better because of improved range condition and feed reserves.
6. Improved vigor, density and composition of range forage can result in increased forage production thus permitting increased stocking rates or avoiding a reduction in livestock numbers.
7. Poisonous plant areas may be deferred until safe for grazing.
8. There is less selectivity of areas, species and individual plants under periodic forced utilization. Preferred plants are grazed but once and use is forced on less desirable plants.
9. Protection of seeded areas and plant control projects can be afforded without non-use or special fencing.
10. Seed production and seedling establishment are enhanced by periodic deferment and rest.

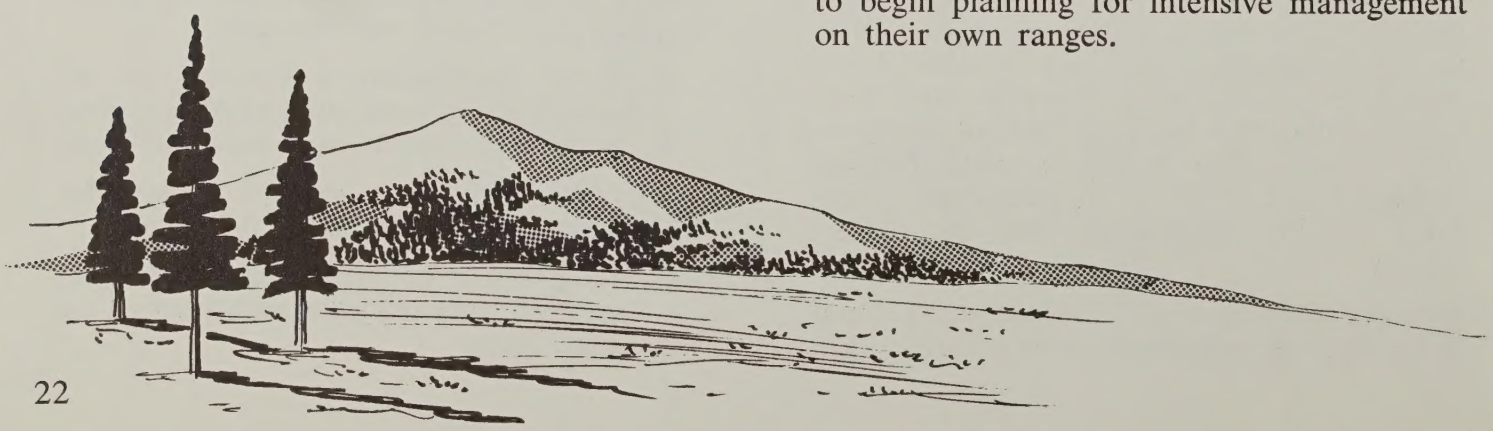
There are some facts, possibly adverse, which must be weighed against the advantages of intensive management systems in specific cases:

1. Initial costs of improvements (fences and waters) necessary to implement the system are often high. With more improvements, total maintenance costs go up.
2. In many cases, intensive management is less convenient for the livestock operator; most systems require more frequent riding and moving of cattle.
3. Under some conditions, operating costs (labor) increase under intensive management.
4. Livestock production is not always increased immediately. This may be offset by arresting declining grazing capacity.
5. Rank, cured feed in deferred pastures may be less palatable and less nutritious to livestock by the time it is grazed in some range types.

Some notes of caution are indicated by the case histories:

1. To assure best results from intensive management systems, stocking rate should not exceed total grazing capacity for the range unit.
2. As nearly as possible, the management subdivisions of a range unit should be nearly equal in grazing capacity. When this is not feasible, the rotation plan becomes more complex.
3. Unless pastures are small, riding and salting for distribution are just as essential under intensive management as under season-long grazing.
4. Forage production and utilization must be observed and measured rather frequently, particularly during the first few years of application of a new management system. This information is needed to determine how the system is working and to guide decisions on modification of the system.

Intensive management is working on a practical scale under a wide variety of conditions. Economy minded ranch operators are profiting by management systems that meet with the approval of their bankers and technical advisors. For many, this is inducement enough to begin planning for intensive management on their own ranges.



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